



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

May 20, 2014

WELL WORK PERMIT
Horizontal 6A Well

This permit, API Well Number: 47-10302987, issued to HG ENERGY, LLC, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin
Chief

Operator's Well No: 406 N-3H
Farm Name: DULANEY, DALE K.
API Well Number: 47-10302987
Permit Type: Horizontal 6A Well
Date Issued: 05/20/2014

Promoting a healthy environment.

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

CK 617346
5150

WW-6B
(9/13)

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: HG Energy, LLC 494497948 Wetzel Grant Big Run 7.5'
Operator ID County District Quadrangle

4 254

2) Operator's Well Number: MA Miller 406 N-3H Well Pad Name: MA Miller 406

3) Farm Name/Surface Owner: MA Miller Public Road Access: SLS 58

4) Elevation, current ground: 1385' Elevation, proposed post-construction: 1369'

5) Well Type (a) Gas Oil Underground Storage
Other

(b) If Gas Shallow Deep
Horizontal

DMH
3-12-14

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus Shale, Approximate TVD 7,080 feet, Anticipated Thickness 50 feet, Associated Gradient Pressure @ 1.1 psi/ft

8) Proposed Total Vertical Depth: TVD 7,080 feet

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: TMD 16,248 feet

11) Proposed Horizontal Leg Length: 8,554 feet

12) Approximate Fresh Water Strata Depths: 115 feet

13) Method to Determine Fresh Water Depths: Based on drilling history in nearby wells

14) Approximate Saltwater Depths: 2,175 feet

15) Approximate Coal Seam Depths: 1,265 feet

16) Approximate Depth to Possible Void (coal mine, karst, other): NA

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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(9/13)

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor	20"	New	H-40	94#	60'	60'	NA (Drilled in)
Fresh Water	13 3/8"	New	J-55	54.5#	1319'	1319'	1400, CTS
Coal							
Intermediate	9 5/8"	New	J-55	40#	3500'	3500'	1550, CTS
Production	5 1/2"	New	P-110	20#	16248'	16248'	4225
Tubing	2 3/8"	New	L-80 or N-80	4.7#	NA	8000'	NA
Liners							

DA 4
3-12-14

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	20"	20"	0.375"	1530#	NA	NA (Drilled In)
Fresh Water	13 3/8"	17 1/2"	0.38"	2740#	Class A	1.21
Coal						
Intermediate	9 5/8"	12 1/4"	0.395"	3950#	Gas Block - Class A	Tail - 1.18 Lead - 1.29
Production	5 1/2"	8 1/2"	0.361"	12640#	50/50 - ASC	Tail - 1.5 Lead - 1.31
Tubing	2 3/8"	4.778"	0.19"	11200#	NA	NA
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

WW-6B
(9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill, case, cement and complete a horizontal Marcellus well.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Plan to hydraulically fracture/stimulate the well with "slickwater" frac technique. Will utilize a plug and perforation technique through the cased hole.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 10.62 acres

22) Area to be disturbed for well pad only, less access road (acres): 4.39 acres

23) Describe centralizer placement for each casing string:

Conductor: NA
Surface: Centralizer every 3 joints or 120'
Intermediate: Centralizer every 3 joints or 120'
Production Centralizer Program: Run 1 spiral centralizer every 120'

24) Describe all cement additives associated with each cement type:

Conductor: NA - Drilled in (Casing while drilling, no annulus)
Surface: Premium NE-1 (Class A Cement) (see attachment for complete description)
Intermediate: Lead: Class A Cement / Tail: Class A Cement (see attachment for complete description)
Production: Lead: Class A (50/50) / Tail: Class A (ASC) (see attachment for complete description)

25) Proposed borehole conditioning procedures:

The wellbore will be properly circulated at TD of each section until as much of the residual drill cuttings have been removed from the wellbore as possible, residual drilling gas has been circulated out and until the mud and wellbore are both constant and stable. Mud properties will be adjusted if needed. Hole cleaning times may vary from well to well, hole section to hole section.

DMH

3-12-14

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*Note: Attach additional sheets as needed.

Cement Additives for WW-6B

Conductor: N/A – Drilled in / Sanded in (Casing While Drilling, no annulus)

Surface Casing:

Premium NE – 1 (Class A Cement) + 3% bwoc calcium Chloride + 0.75 gals/100 sack FP-12L (ANTI-FOAM) + 0.25 Lbs/sack Cello Flake (Lost Circulation Material)

Cement variance Attached -UKC

Intermediate Casing:

Lead:

Type 1 Cement + 0.75 gals/100 sack FP (ANTI-FOAM) 12L + 0.25 lbs/sack Cello Flake (Lost Circulation)

Tail: Gas-Blok Blend

Premium NE-1 (Class A Cement) + 0.55% bwoc BA-10A (Bonding Agent) + 1% bwoc EC-1 (Bonding Agent) + 0.5% bwoc Sodium Metasilicate (Viscosifier) + 0.25 lbs/sack Cello Flake (Lost Circulation) + 0.75 gals/100 sack FP-12L (Anti-Foam)

Production:

Lead #1

(50:50) Poz (Fly Ash): Premium NE – 1 (Class A Cement) + 0.25% bwoc R-3 (Retarder) + 1% bwoc EC-1 (Bonding Agent) + 0.75 gals/100 0.25% bwoc R-3 (Retarder) + 1% bwoc EC-1 (Bonding Agent) + 0.75 gals/100 sack FP-12L (Anti-Foam) + 0.125 lbs/sack Cello Flake (Lost Circulation) + 0.5% bwoc MPA-170 (Multi Purpose Additive), ie Fluid Loss, Free Water and Stabilization

DmH 3-12-11

Lead #2

676 sacks (50:50) Poz (Fly Ash): Premium NE-1 (Class A Cement) + 0.125 lbs/sack Cello Flake (Lost Circulation) + 0.3% bwoc CD-32 (Dispersant) + 0.4% bwoc BA-59 (Bonding Agent) + 0.5% bwoc MPA-170 (Multi Purpose Additive), sack + 7.5 lbs/sack BA-90 (Bonding Agent) +0.3% bwoc R-3 (Retarder) + 0.75 gals/100 sack FP-12L (Anti-Foam)

Lead #3

Premium NE-1 (Class A Cement) + 0.5% bwoc R-3 (Retarder) + 0.75 gals/100 sack FP-12L (Anti-Foam) + 0.125 lbs/sack Cello Flake (Lost Circulation) + 0.25% bwoc CD-32 (Dispersant) + 0.6% bwoc Sodium Metasilicate (Viscosifier) + 1.2% bwoc BA-10A (Bonding Agent) + 10 lbs/sack ASCA-1 (Solubility Aid).

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Earl Ray Tomblin, Governor
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October 31, 2013

Schlumberger
Attn: Daniel L. Sikorski
4600 J Barry Court
Suite 200
Canonsburg, PA 15317

RE: Cement Variance Request

Dear Sir:

This agency has approved a variance request for the cement blend listed below to be used on surface and coal protection casing only. The variance cannot be used without an oil and gas operator requesting its use on a permit application and approved by this agency:

- 2% Accelerator (S001)
- 0.2% Antifoam (D046)
- 0.125 lb/sk Polyester Flake (D0130)

If you have any questions regarding this matter feel free to contact me at 304-926-0499, ext. 1653.

Sincerely,

James Peterson
Environmental Resources Analyst

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**BEFORE THE OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF WEST VIRGINIA**

IN THE MATTER OF A VARIANCE FROM) REGULATION 35 CSR § 4-11.4/11.5/14.1) AND 35 CSR § 8-9.2.h. 4/5/6/8 OF THE) THE OPERATIONAL) REGULATIONS OF CEMENTING OIL) AND GAS WELLS)))))))	ORDER NO. 2013-78
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------	--------------------------

REPORT OF THE OFFICE

Schlumberger requests approval of a different cement blend for use in cementing surface and coal protection casing of oil and gas wells.

FINDINGS OF FACT

- 1.) Schlumberger proposes the following cement blend:
 - 2% Accelerator (S001)
 - 0.2% Antifoam (D046)
 - 0.125 lb/sk Polyester Flake (D130)

- 2.) Schlumberger laboratory testing results indicate that the blend listed in Fact No.1 will achieve a 500 psi compressive strength within 5 hours, 22 minutes and a 1200 psi compressive strength within 10 hours, 29 minutes.

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CONCLUSIONS OF LAW

Pursuant to Articles 6 and 6A, Chapter 22 of the Code of West Virginia, the Office of Oil and Gas has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order.

Pursuant to 35 CSR § 4-11.5 and 35 CSR § 8-9.2.h.8 the Chief of the Office of Oil and Gas may approve different cement blends upon the well operator providing satisfactory proof that different cement types are adequate.

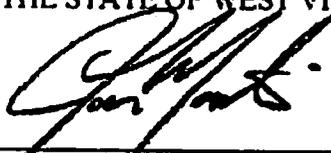
ORDER

It is ordered that Schlumberger may use the cement blend listed in Findings of Fact No. 1 for the cementing of surface and coal protection casing of oil and gas wells in the State as may be requested by oil and gas operators. The waiting time on the cement blend shall be 8 hours. The cement blend shall be mixed in strict accordance with the specifications for each blend and weight measurements made on-site to assure the cement slurries meet the minimum weight specifications. A sample shall be collected and, if after 8 hours the cement is not set up, additional time will be required. Schlumberger shall keep a record of cement blend jobs in which the cement blend approved under this order is to be used and made available to the Office of Oil and Gas upon request.

Dated this, the 31st day of October, 2013.

IN THE NAME OF THE STATE OF WEST VIRGINIA

OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OF THE STATE OF WEST VIRGINIA



James Martin, Chief
Office of Oil and Gas

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Laboratory Cement Test Report- 15.6 PPG SURFACE
Weston District Laboratory

Fluid No : WES13-364P3	Client : NOBLE	Location / Rig : N/A	Signatures
Date : Oct-06-2013	Well Name : WEST VIRGINIA	Field : N/A	Mclaughlin

Job Type	SURFACE	Depth	700.0 ft	TVD	700.0 ft
BHST	63 degF	BHCT	78 degF	BHP	494 psi
Starting Temp.	80 degF	Time to Temp.	00:09 hr:mn	Heating Rate	-0.22 degF/min
Starting Pressure	179 psi	Time to Pressure	00:09 hr:mn	Schedule	9.2-1

Composition					
Slurry Density	16.60 lb/gal	Yield	1.20 ft ³ /sk	Mix Fluid	5.252 gal/sk
Solid Vol. Fraction	41.4 %	Porosity	58.6 %	Slurry type	Conventional

Code	Concentration	Sack Reference	Component	Blend Density	Lot Number
D801 - API A		94 lb of BLEND	Blend	197.27 lb/ft ³	08-13-13/6-20
Fresh water	5.252 gal/sk		Base Fluid		
S001	2.000 %BWOC		Accelerator		364AJ1632
D046	0.200 %BWOC		Antifoam		TU3G0700A0
D130	0.125 lb/sk		Lost circ		BULK

Rheology
Geometry: R1B1F1.0
S/N 10-1287-003

Temperature (min)	Up (deg)	78 degF Down (deg)	Average (deg)
300	63.0	63.0	63.0
200	66.0	67.0	66.5
100	46.0	49.0	47.5
60	41.0	46.0	43.5
30	33.0	43.0	38.0
6	20.6	27.7	24.2
3	16.6	20.5	18.5

10 sec Gel	23 deg - 24.55 lb/100ft ²
10 min Gel	53 deg - 56.57 lb/100ft ²
Rheo. computed	Viscosity: 25.792 cP Yield Point: 38.21 lb/100ft ²

UCA Compressive Strength
S/N 501R

Time	CS
05:22 hr:mn	500 psi
10:29 hr:mn	1260 psi

Free Fluid

1.0 mL/250mL in 2 hrs
At 78 degF and 0 deg incl
Sedimentation: None

Comments

General Comment:
Note: This is a pilot test. Field may differ after testing. Please read field report carefully and compare to pilot report and log out. Contact the laboratory with any questions or concerns.

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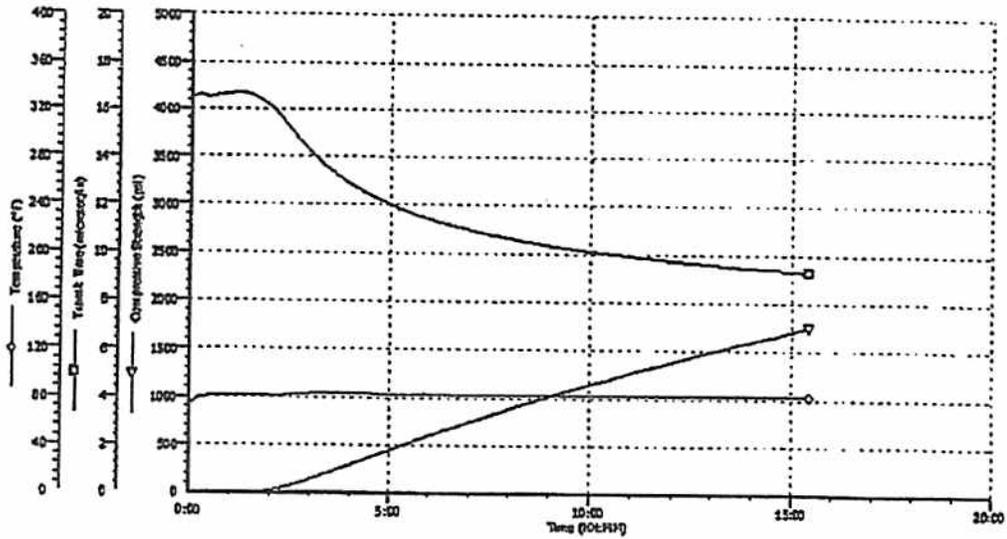


UCA Graph

Well 13-30-APS-1 North West Virginia Surface
10/4/2013 4:23:02 PM
10/5/2013 8:04:31 AM
11.6 ppg
Compressive strength type B (more than 1.4 bps)

NOBLE WY
Customer: NOBLE
D001APIA
2% GGI + 0.2% EDAS-0.125 pp + 0.133
Surface
01 RC-H201R

B>CC70* F
D>GT33 F
80 psi @ 22:00
800 psi @ 5:22:00
Current CR: 1743 psi



SCHLUMBERGER
Wellbore Services Laboratory

Well File Name: Well13-30-APS-1 North West Virginia Surface
Printed: 10/5/2013 12:33:02 PM

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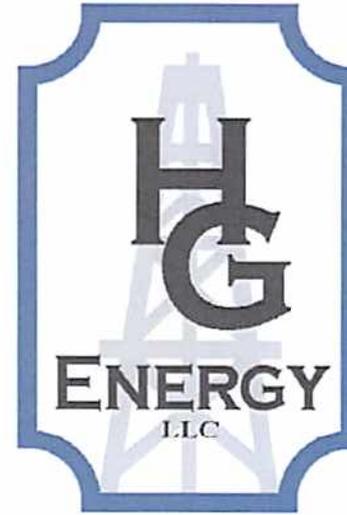
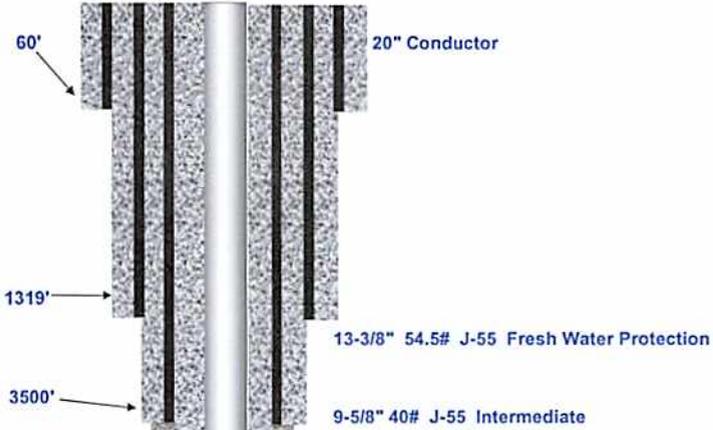
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WELL: M.A. Miller 406 N -3H

Horizontal Marcellus Casing Schematic

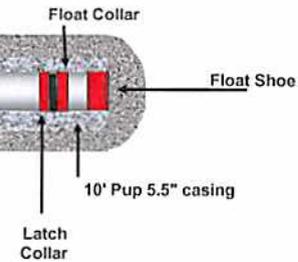
DRAWING NOT TO SCALE



Production Centralizer Program
Run 1 spiral centralizer every 120' from the 1st 5.5" long joint to the top of the curve.
Run 1 spiral centralizer every 200' from the top of the curve to surface.

Production Casing: Approx. 16,225' of 5-1/2" 20# P-110 Production

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REC
01300



Dmit
3-12-14

103-02987

Form WW-9

Operator's Well No. MA Miller 406 N-3H

HG Energy, LLC

Proposed Revegetation Treatment: Acres Disturbed Approximately 11 Prevegetation pH _____

Lime 2 Tons/acre or to correct to pH 6.5

Fertilizer type 10/20/20

Fertilizer amount 500 lbs/acre

Mulch 2 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: _____

Title: Oil & Gas Inspector

Date: 3-12-14

Field Reviewed? Yes No

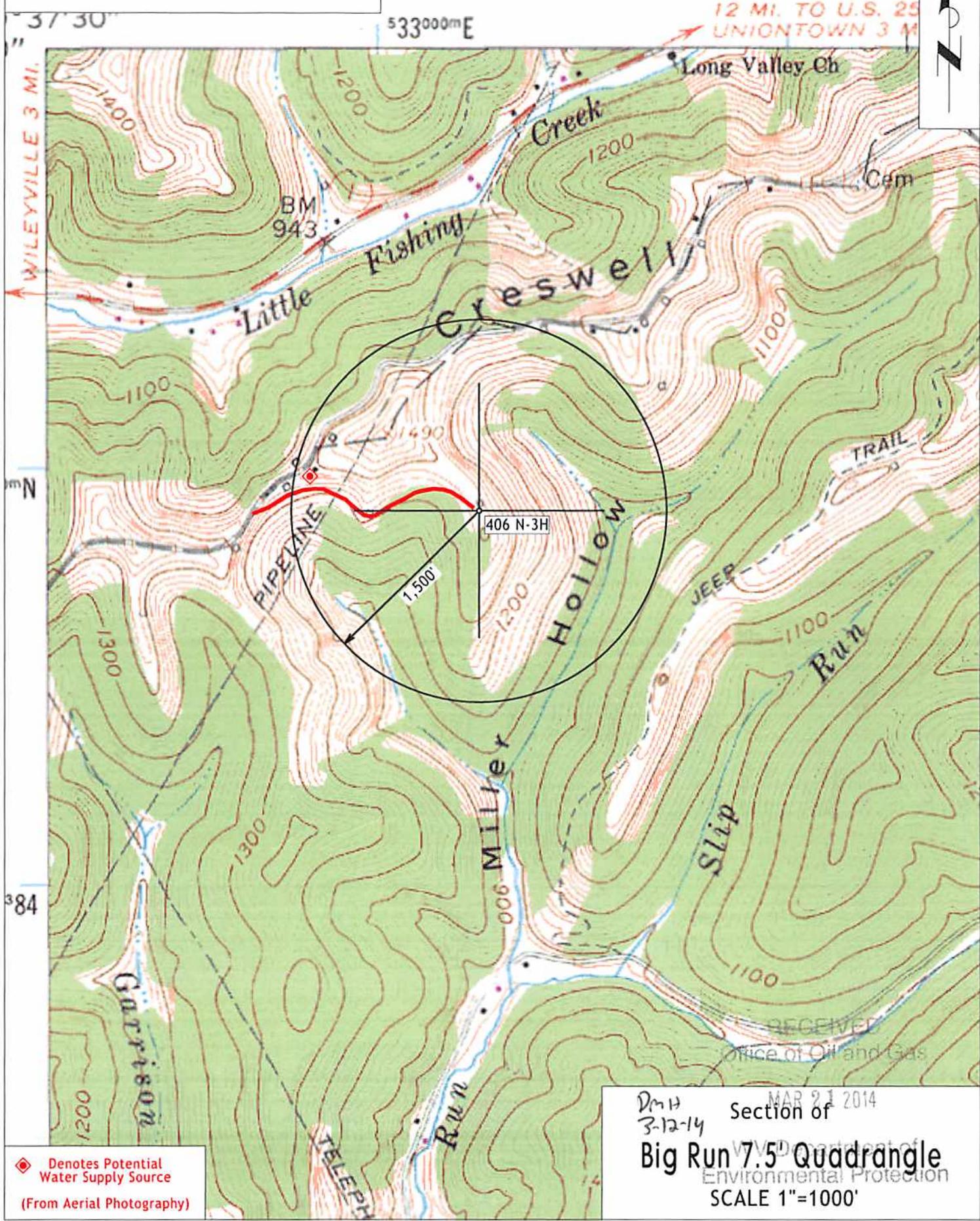
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SUBJECT WELL
Mary A. Miller 406 N-3H

OF THE INTERIOR AL SURVEY



WILEYVILLE 3 MI.

12 MI. TO U.S. 25
UNIONTOWN 3 MI

Long Valley Oh

Cem

406 N-3H

1,500'

37° 30'

384

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Section of
Big Run 7.5 Quadrangle
SCALE 1"=1000'

Denotes Potential
Water Supply Source
(From Aerial Photography)

BOTTOM HOLE: LON:-80°38'04.9"

LON: -80°36'45.5"

8255

LAT: 39°37'30"

MAP OF
H.G. ENERGY, LLC
-MILLER 406 UNIT-

LON: 80°35'00"

3625

LAT:39°36'54.2"

BOTTOM HOLE: LAT:39°37'56.0"

SURVEY NOTES

1 - Well ties and Latitude and Longitude were measured by DGPS (Sub-meter Mapping Grade). Bearings are referenced to UTM Grid North (Zone 17 North - NAD 1927).

2 - Surface owners & adjoiners information obtained from Wetzel Co. Assessors' Office. Lease names, & line mapping provided by HGE GIS system. Ends of unit lines mapped by MLS LLC & HGE.

3 - No Title Opinion was provided to the Surveyor during this survey. This survey is subject to a complete title Opinion.

UTM Coordinates
(Zone 17N-NAD 1983)

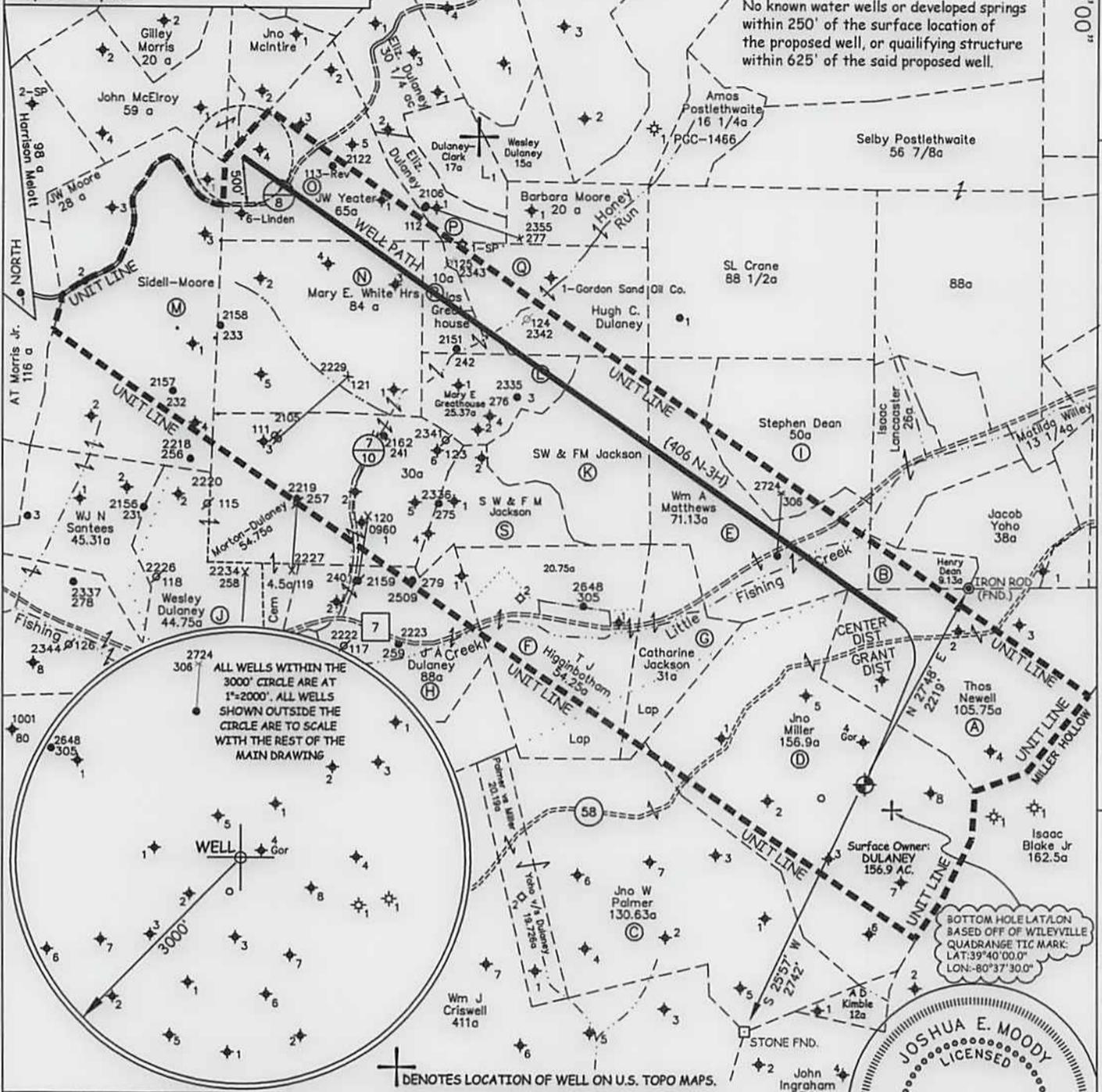
Surface N-4,385,114m.
E-533,266m.

Bottom Hole N-4,387,013m.
E-531,364m.

NAD83 LOCATION REFERENCES

N 42°24' W 531' 5/8" REBAR
S 21°23' E 205' SPIKE

No known water wells or developed springs within 250' of the surface location of the proposed well, or qualifying structure within 625' of the said proposed well.



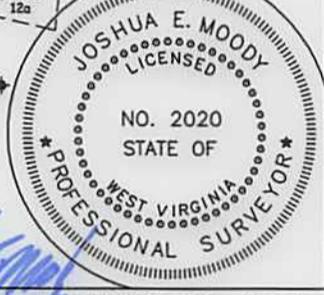
JOB # 13-001
DRAWING # 13HG405B 406B
SCALE 1" = 1500'
MINIMUM DEGREE OF ACCURACY 1/200'
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

MOODY LAND SURVEYING, LLC
ST. MARYS, WV 26170



JOSHUA E. MOODY, P.S. 2020
DATE 1/27/14
OPERATOR'S WELL # 406 N-3H

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL HORIZONTAL
(IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
LOCATION: ELEVATION 1369' WATERSHED NORTH FOR, FISHING CREEK API WELL # 47-103-02997 H6A
DISTRICT GRANT COUNTY WETZEL STATE WV COUNTY WV PERMIT 02997 H6A
QUADRANGLE BIG RUN 7.5'

SURFACE OWNER DALE K. DULANEY (surface hole) ACREAGE 156.9 AC. +/-
OIL & GAS ROYALTY OWNER ARTHUR MILLER et al LEASE ACREAGE 156.9 AC. +/-
PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION
OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____
PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS
WELL OPERATOR H.G. ENERGY, LLC ESTIMATED DEPTH TVD= 7,080' MD= 16,248'
ADDRESS 5260 DuPONT ROAD DESIGNATED AGENT MIKE KIRSCH
PARKERSBURG, WV 26101 ADDRESS 5260 DuPONT ROAD
PARKERSBURG, WV 26101

COUNTY NAME PERMIT